

## REMARKS

**Claims 1-18** are all the claims pending in the application. By this Amendment, Applicants amend **claims 1, 7, and 10** for clarity and add **new claims 15-18**. No new subject matter has been entered.

### I. Rejection of claims 1-14

**Claims 1-14** are rejected under 35 U.S.C. § 103(a) as being unpatentable over Muench (U.S. Patent No. 4,977,950) in view of Mori (JP Patent Document No. 2001/105106).

**Claim 1** recites among other elements: “each of said protrusion portions or the concave portions has a size satisfying expressions:  $H \geq 2\text{mm}$  ,  $L > 2 \times H$ , in which H is a maximum height of the protrusion portion or a maximum depth of the concave portion, and L is a maximum length of a base portion.”

**Muench** describes a rotating injection nozzle with internal elements, such as notches or serrations. (See Fig. 3). Further, Muench describes a combination nozzle, in which the rotating nozzle including internal elements is combined with a stationary nozzle. (See Fig. 6).

Additionally, claim 1 has been amended to clarify that the casting nozzle is an immersion nozzle. The immersion nozzle is the nozzle which casts by immersing in a molten metal tank, as described, for example, in the specification on page 30, line 3 to page 31, line 15. Therefore, Muench is not applicable because Muench is directed to the injection nozzle which operates by spreading a flow of molten metal from the end of the nozzle.

Applicants submit that Muench teaches away from the invention and respectfully request Muench be withdrawn.

**Mori** describes an immersion nozzle with a rugged inner hole. A depth from the projection part to the recession part is 0.5-5mm. The interval between the projections and recessions is 1-20mm. (Abstract, Fig. 2).

However, Mori does not teach the size of the base portion of the protrusions or recessions. In Mori, the surface of the inner hole is wave-like. The protrusions and recessions, therefore, do not have bases.

Additionally, Mori describes an interval between the projections and recessions. Mori does not teach or suggest a specific functional relationship between the height of the protrusions or recessions and the size of the base portion. To the contrary, claim 1 calls for the length of the base portion of the protrusion or recession to be twice as the height of the protrusion or recession.

Further, there is no teaching, suggestion, or motivation to combine or modify Muench with Mori. Applicants were first to discover a specific relationship between the length of the base portion of the independent member and its height.

Moreover, since an exemplary embodiment provides improved performance of the immersion nozzle, as discovered by Applicants, the exemplary embodiment cannot be obvious. As described and documented in the specification of the present application, it took a great deal of experimentation and trying to discover the appropriate dimensions of the independent members and relationships between the length of the base portion of the independent members and their heights. The same is true for various shapes of the independent members and their positioning in the inner hole. Therefore, Applicants demonstrated the criticality of the recited features.

Further, as discussed above, Mori does not teach or suggest base portions, and, accordingly, particular dimensions for the length of the base portions. Accordingly, the Examiner's conclusion of obviousness is definitely based on the improper hindsight including only the knowledge gleaned from the Applicants' own disclosure. The Examiner provides no objective evidence substantiating his position. Such determination of obviousness is improper.

Additionally, the channel of Muench includes serrations or notches. The channel of Mori includes wave-like surface. Muench will require a complete redesign to be combined with Mori. This will result in expensive and impractical solution which will change the principle of operation of Muench.

Finally, as discussed above, Muench describes the injection nozzle. Mori describes an immersion nozzle. A combination proposed by the Examiner will result in an inoperable solution.

Accordingly, neither Muench, nor Mori, taken singularly or in combination, teaches or suggests at least "each of said protrusion portions or the concave portions has a size satisfying expressions:  $H \geq 2\text{mm}$ ,  $L > 2 \times H$ , in which  $H$  is a maximum height of the protrusion portion or

a maximum depth of the concave portion, and L is a maximum length of a base portion,” and also there is no teaching, suggestion, or motivation to combine or modify Muench with Mori.

Therefore, **claim 1 and dependent claims 2-14** are patentable Muench and Mori.

In addition, **claim 2** recites “an expression:  $L \leq \pi D/3$  in which L is the maximum length of a base portion of the protrusion portion or the concave portion, and D is an inner diameter of the nozzle before the protrusion portions or concave portions are disposed.”

Neither Muench, nor Mori, taken singularly or in combination, teaches or suggests a relationship between the maximum length of the independent member base portion and the inner diameter of the nozzle.

Additionally, it is not obvious to “proclaim” the specific recited dimensions, as the Examiner contends, at least for the reasons similar to those discussed above regarding claim 1.

Accordingly, **claim 2** is patentable.

## II. New Claims

In order to provide more varied protection, Applicants add new **claims 15-18**, which are patentable at least by virtue of their dependencies and for additional features set forth therein.

Support for new claims is found in the specification, for example:

Claims 15, 16 – p. 22 lines 11-16;

Claim 17 – p. 22, lines 11-16 and p. 29, lines 2-6;

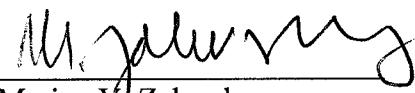
Claim 18 – p. 19, line 25 – p. 20, lines 1-3.

## CONCLUSION

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

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Respectfully submitted,

  
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